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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,237	11/21/2001	Hiroshi Suganuma	09792909-5265	1922
26263	7590	06/14/2005	EXAMINER	
SONNENSCHN NATH & ROSENTHAL LLP			CHANG, AUDREY Y	
P.O. BOX 061080			ART UNIT	
WACKER DRIVE STATION, SEARS TOWER			PAPER NUMBER	
CHICAGO, IL 60606-1080			2872	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,237

Applicant(s)

SUGANUMA, HIROSHI

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2005.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-14 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 6, 2005 has been entered.
2. This Office Action is also in response to applicant's amendment filed on April 6, 2005, which has been entered into the file.
3. By this amendment, the applicant has amended claims 1-3, and 6-8 and has newly added claims 9-14.
4. Claims 1-14 remain pending in this application.

Specification

5. A substitute specification excluding the claims is required pursuant to 37 CFR 1.125(a) because the amendment to specification submitted by the applicant on April 6, 2005 is too massive and complicated that causes difficulty in entering and considering the specification.

A substitute specification must not contain new matter. The substitute specification must be submitted with markings showing all the changes relative to the immediate prior version of the specification of record. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets

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if strike-through cannot be easily perceived. An accompanying clean version (without markings) and a statement that the substitute specification contains no new matter must also be supplied. Numbering the paragraphs of the specification of record is not considered a change that must be shown.

Response to Amendment

6. The amendment filed on April 6, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **claims 1 and 6** have been amended to include the phrase “the entire top surface of each element selectively moves upward and downward during operation of the display apparatus” and **claim 7 has been amended** to include the features concerning the “scanning in a direction parallel to said one-dimensional direction“.

The specification simply fails to teach that the *entire top surface* of each element selective moves upward and downward. The applicant is also reminded that the direction of scanning is different from the rotational axis of the scanner. It appears that the rotational axis of the scanner may be parallel to the one direction of the modulator, but not the scanning direction. Scanning direction is referred to the actual direction of the light after being scanned by the scanner. It is impossible for the light to be scanned in the direction *parallel* to the one dimension of the modulator since if this is the case the light will not reach the diffuser screen.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. **Claims 1-7, and 9-12 are rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the paragraph above.

9. **Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1, 6, 7 and 8 and their respective dependent claims recite a “*stereoscopic image display apparatus*” however the specification and the claims fail to teach how could stereoscopic image be displayed by simply having a one dimensional spatial modulator (or grating light valve) and a scan unit (as recited in claims). It is known in the art that stereoscopic *vision* is an **illusion** of observer’s eye caused by viewing two “stereoscopically related” *two-dimensional* images. A pair of *stereoscopically related images* needs to be transmitted to proper eye of the observer *respectively*, and then *stereoscopic vision* can be created. It is therefore not clear how do the scan unit and the spatial light modulator work to create the claimed “stereoscopic image display”. The specification and the claims **fail at this juncture** to teach where does the image come from. The grating light valve (GLV) as stated in the specification **only** gives *arbitrary phase distribution*. **It is not clear** if any image information is generated from the light valve or not. It is also not clear if the “arbitrary phase distribution” has anything to do with the “image” or not. The stereoscopic image display system recited in the claims therefore is **not operable**. Further a Fourier function as understood in the mathematical term is **only** an operational function that **performs**

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certain “transformation” **on another function**. So the phrase “spatial modulator is *controlled* in part according to a Fourier transformation function” is not making any sense since it is not clear the Fourier transformation function *is operated on what*? What is being transformed here? This makes the control of the spatial light modulator not enable. **The limitations “stereoscopic image display” is not enable.**

Furthermore, the specification and the claims **fail** to teach how could “horizontal parallax” and “vertical parallax” be achieved by simply scanning the light. Parallax effect has a lot to do with the *specific image information* is being scanned. Simply scanning light in certain direction will not achieve “parallax” effect.

The specification and the claims also fail to teach how could each of the elements of the spatial light modulator be operated to have its *entire top surface* moves upward and downward. The elements *have to be held* by something and cannot stand in air by itself to make the “entire” top surface moves upward or downward.

Clarifications are certainly required.

Claim Objections

10. **Claims 1-14 are objected to because of the following informalities:**

(1). The claim language as stands now contains numerous errors and confusions that really makes the scopes of the claims are not clear and indefinite. The applicant is *respectfully requested* to correct **all** the discrepancies and errors in the claims to make them in comply with the requirements of 35 USC 112, paragraphs. The claims include the following phrases “an arraying direction”, “one direction”, “scan unit axis” and “scan ... in a direction” that all very confusing and not clear how are they related to each other to make the scopes of the claims clear.

(2). The phrase “in a direction *intermediate* said perpendicular direction” recited in claim 10 is very confusing since it is not clear what does it mean by “intermediate”?

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(3). The phrase “means for spatially modulating is controlled in part according to a Fourier transformation function” recited in claim 7 and the phrase “modulating the coherent light in a one-dimensional direction in accordance with a Fourier transformation function” recited in claim 8 are confusing and indefinite since it is not clear the Fourier transformation function of **what** is referred here.

(4). Claim 9 is incomplete since it is not clear what is the structural relationship between the “volume type hologram” and the rest of the elements to make the apparatus operable.

(5). It is not clear if the rotation of the modulator, as recited in claim 14, achieves the scanning function as stated in its based claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. **Claims 1 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued to Bloom et al (PN. 6,215,579).**

Bloom et al teaches an *image display system* (400, Figure 14) wherein the system is comprised of a *light source having LEDs* (404R, 404G, 404B) for *generating laser beams having wavelengths in predetermined ranges of red, green and blue color*. The laser beams illuminate a *Grating Light Valve*

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(402), which is an *one-dimensional spatial light modulator*, (please see Figure 10 for its one dimensional arrangement) for modulating the laser beams. The modulated laser beams are then *scanned* by a *scanning mirror* (432) to the *direction* and then the location of an observer (434) for displaying **an image**, (please see Figure 14, and columns 7-12). Bloom et al teaches that the one dimensional grating light valve has a plurality of *one-dimensionally arrayed elements* (200, Figures 7-18) that each of the elements has a *top surface* defined between the post position (110) and the *entire* top surface is selected to move upward and downward for modulating the light. The elements are *selectively* driven by applying the voltage and which means they could be independently driven.

This reference however does not teach explicitly that the image display apparatus is a stereoscopic image display apparatus. But this feature is recited in the claim as an intended use without the actual elements or criterions to make it displaying stereoscopic image. It therefore has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Madham, 2 USPQ2d 1647 (1987).

This reference has therefore anticipated the claims.

13. Claims 7-8 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Kajiki (PN. 5,694,235).

Kajiki teaches a *three dimensional image display apparatus*, (Figure 9) that is comprised of a *light source array* (17) for radiating coherent light, a *spatial light modulator* (19), that has the function of spatially modulating light of the source array in a *one-dimensional fashion*, (please see the one-dimensional arrangement of the modulated light from the modulator) and a *vertical scanning unit* (4) and a *polygon mirror scanning unit* (3) for scanning the modulated light to a predetermined direction of the observer (21) to enable three dimensional image observation, (please see columns 7 and 9). Kajiki

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teaches that the *vertical* scanner (4) and a *horizontal* scanner (3), which is a *polygonal mirror*, have scanning axes that are orthogonal to each other. The horizontal scanner (3) allows the horizontal parallax effect of the image is established and the vertical scanner (4) allows the vertical parallax effect of the image is established, (please see Figure 4). It is implicitly true that the directions of the scanning from both of the scanners, which referred to the actual direction of the light after the scanners, are also orthogonal to each other with one parallel to the modulation elements and one perpendicular to the modulation elements, for creating two-dimensionally *extended* image at the viewer position. With regard to claim 13, Kajiki teaches that the two scanners have different scanning speeds, (please column 9, lines 45-54).

The feature concerning the “modulator is controlled in part according to a Fourier transformation function” is indefinite and is rejected for the reasons stated above and it can only be examined in the broadest interpretation. Although the reference does not teach the modulation is controlled according to a Fourier transformation *explicitly*, however since the claims also fail to explicitly state the Fourier transformation function of **what** is being claimed here, such feature therefore can be met by the reasons states as follows. It is implicitly true that the modulator of Kajiki has to modulate the light *according to a function* and it is also implicitly true that *any function* can be expressed in terms of Fourier series and therefore considered to be a Fourier transformation of another function.

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 1-5 and 6 and newly added claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kajiki (PN. 5,694,235) in view of the patents issued to Bloom et al (PN. 6,215,579).

Kajiki teaches a *three dimensional image display apparatus*, (Figure 9) that is comprised of a *light source array* (17) for radiating coherent light, a *spatial light modulator* (19), that has the function of modulating light of the source array in a *one-dimensional fashion*, (please see the one-dimensional arrangement of the modulated light from the modulator) and a *vertical scanning unit* (4) and a *polygon mirror scanning unit* (3) for scanning the modulated light to a predetermined direction of the observer (21) to enable three-dimensional image observation, (please see columns 7 and 9).

With regard to claim 6, Kajiki teaches explicitly that *collimator lens* (22, Figure 11 or 14a, 14b in Figure 13) is used to make the modulated light from the modulator *collimated* to each other. The modulated light after being scanned is focused and Fourier transformed by the lens (2) and is directed to a *diffusion plate* (20) for allowing the image being displayed.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the spatial light modulator that modulates light in one-dimensional manner is a grating light valve (GLV) and does not teach explicitly that it has a plurality of one-dimensionally arrayed elements having top surfaces and the entire top surface of each elements is selectively moves upward and downward in the operation of the display. However grating light valve (GLV) is one of well known and widely used spatial light modulators in the art, as explicitly taught by Bloom. Bloom et al teaches an *image display system* (400, Figure 14) wherein the system is comprised of a *light source having LEDs* (404R, 404G, 404B) for *generating laser beams* to illuminate a *Grating Light Valve* (402), which is an *one-dimensional spatial light modulator*, (please see Figure 10 for its one dimensional arrangement) for modulating the laser beams. The modulated laser beams are then *scanned* by a *scanning mirror* (432) to

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the *direction* and then the location of an observer (434) for displaying an **image**, (please see Figure 14, and columns 7-12). **Bloom** et al teaches that the *one dimensional grating light valve* has a plurality of *one-dimensionally arrayed elements* (200, Figures 7-18) that each of the elements has a *top surface* defined between the post position (110) and the *entire* top surface is selected to move upward and downward for modulating the light. The elements are *selectively* driven by applying the voltage and which means they could be independently driven as desired. It would then have been obvious to one skilled in the art to apply the teachings of **Bloom** to make the one dimensional modulator of **Kajiki** a grating light valve having the structure explicitly stated above for the benefit of allowing the modulation of the light from the light source array with greater efficiency and control which therefore ensure the image display quality.

With regard to claims 2 and 3, **Kajiki** teaches that the scanning unit include a *vertical* scanner (4) and a *horizontal* scanner (3), which is a *polygonal mirror*, wherein the two scanners has scanning axes that are orthogonal to each other. The horizontal scanner (3) allows the horizontal parallax effect of the image is established and the vertical scanner (4) allows the vertical parallax effect of the image is established, (please see Figure 4). It is implicitly true that the directions of the scanning from both of the scanners, which referred to the actual direction of the light after the scanners, are also orthogonal to each other with one parallel to the modulation elements and one perpendicular to the modulation elements, for creating two-dimensionally *extended* image at the viewer position.

With regard to claim 4, **Kajiki** teaches to use a *diffusion plate* for reproducing and displaying the stereoscopic image to the observer.

With regard to claim 11, **Kajiki** teaches that the vertical scanner (4) includes a galvano mirror (8) and the horizontal scanner (3) may also include a galvano mirror, (please see Figure 4, column 9, lines 45-54).

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With regard to claim 12, Kajiki teaches explicitly that *collimator lens* (22, Figure 11 or 14a, 14b in Figure 13) is used to make the modulated light from the modulator *collimated* to each other before entering the scanning units. The modulated light after being scanned is focused and Fourier transformed by the lens (2) and is directed to a *diffusion plate* (20) for allowing the image being displayed.

16. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Kajiki and Bloom et al as applied to claim 1 above, and further in view of the patent issued to Burr et al (PN. 5,550,779).

The three dimensional image display apparatus taught by Kajiki in combination of the teachings of Bloom et al have met all the limitations of the claims. Kajiki teaches that the scanning system comprises galvano mirror and polygonal mirror but it does not teach explicitly that it may also comprise staged mirror. The feature concerning the “volume hologram” is really not clear since the specification and the claims fail to give the proper structural relationship of the hologram with other elements of the display apparatus to determine the function of the volume hologram. It can only be examined with the broadest interpretation. **Burr** in the same field of the endeavor teaches a staged mirror, (14, 16 or 54) which can be diffractive grating elements (or therefore an holographic element), that is comprised of staged reflective elements, (please see Figures 2-4, 8 and 11) for directing light beam to different vertical direction. It would then have been obvious to one skilled in the art to modify the structure of Kajiki to use staged mirror as alternative means for scanning the light for the benefit of allowing more efficient control of the scanning of the light beams.

17. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kajiki (PN. 5,694,235).

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The three dimensional image display apparatus taught by **Kajiki** as described for claim 8 above has met all the limitations of the claim. Kajiki teaches that the spatial modulation is achieved by a spatial modulator (19). This reference however does not teach explicitly to rotate modulator yet it is not clear if this means the rotation of the modulator achieve the scanning function. Since scanning of the modulated light is the essential criterion for the stereoscopic image display to occur, to use a scanner or to rotate the modulator itself will achieve the same scanning function, it would have been obvious to one skilled in the art to modify the arrangement to rotate the modulator for achieving the scanning function for the benefit of eliminating the needs of the scanners.

Response to Arguments

18. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

Contact Information

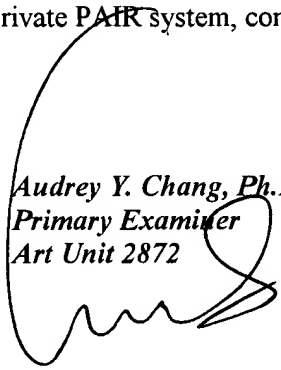
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.